13th Annual
Scholarly Activity and Research Program (SARP) Symposium

October 12th and 13th 2022

8:00 AM – 12:00 PM

Room: MSBII-1A105

2022 SARP Symposium Schedule & Abstracts

SARP team:

- Dr. Jessica Chacon (Course director)
- Dr. Nathan Holland (Course director)
- Dr. Curt Pfarr (Course director)
- Mr. Michael Mercado (Unit Associate Director)

Special thanks to Dr. Gowdy and Dr. Clegg for their presentations.

Also, thanks to all the judges, timekeepers and support staff for their help and dedication to our students, and to all the students and their mentors for their hard work and scholarship.

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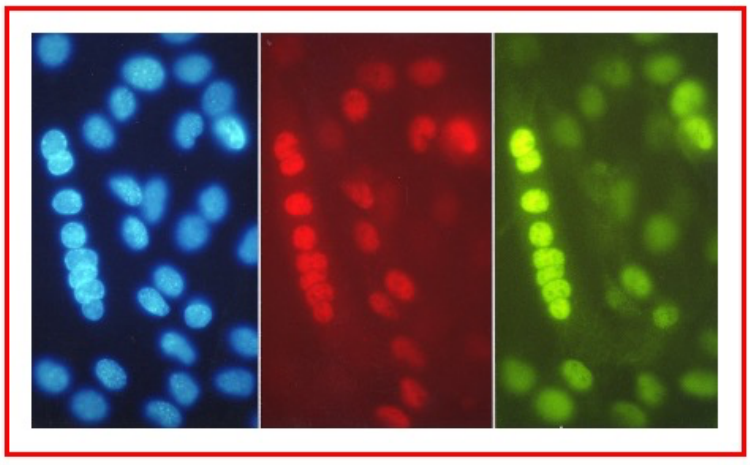


Schedule

Wednesday, October 12

Student SARP poster presentations and judging (Room: MEB2 1A105)

8:00 AM – 8:05 AM

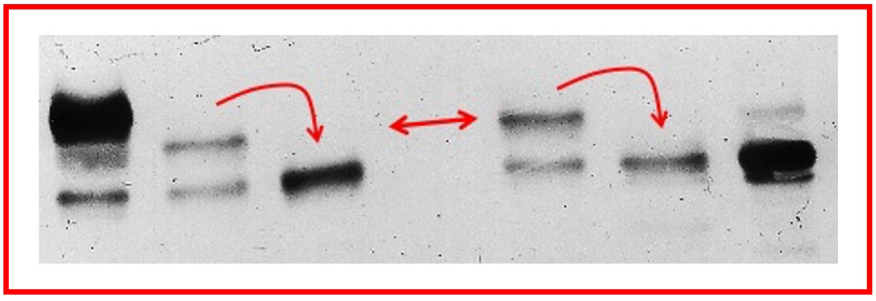
Introduction and Welcome: **Curt Pfarr, Ph.D.**
Department of Medical Education

8:10 AM – 8:20 AM

"*Research resources*"
Deborah Clegg, **Ph.D.**
Professor
Internal Medicine
Vice President for Research TTUHSC – El Paso

8:25 AM – 8:55 AM

Keynote Address: "*Lessons in biomedical research: A tale of mentors, mentees, and perseverance*"
Kymberly M. Gowdy, M.S., Ph.D.
Associate Professor
Division of Pulmonary, Critical Care, and Sleep Medicine
Department of Internal Medicine
Ohio State University



STUDENT ROSTERS – OCTOBER 12:

9:00 AM – 9:30 AM

Sebastian, Lily	The Effects of Prior Pregnancy on the Risk of Breast Cancer
Patel, Ritu	Effects of COVID-19 Pandemic on FSOM MS1 Life Satisfaction, Cohort Interactions, and Education
Springer, Aden	Higher Incidence of Proximal Extension of the Ligamentous Disruption in Adolescents Lisfranc Injuries
Jilani, Misbah -	Team Sport Participation in Wheelchair Athletes Positively Impacts Neurocognitive Function
Alfaori, Qusay	The Sensitivity of Lysenin Voltage-Gating Channel to Host Electrolyte's Concentration Gradient

9:30 AM – 10:00 AM

Tychhon, Boranai	Novel non-ATPase proteosome subunits as biomarkers and targets in FLT3+ acute myeloid leukemia (AML)
Riva, Hannah	Cutaneous melanoma treatment outcomes in Texas: A study of the Texas Cancer Registry/Medicare linked database
Ramirez, Fabiola	Immunotherapy treatment disparities: a TCR analysis of patients with melanoma in the state of Texas.
Smith, Seth	Neuroanatomical Differences in Cannabis Users from the Human Connectome Project
Khong, Caroline	Obesity in Predominantly Hispanic Children at the US-Mexico Border Before, During, and After the COVID-19 Pandemic

10:00 AM – 10:30 AM

Orhii, Paulette	The Effect of Early Family Intervention in Children At-Risk for Severe Mental Illness
Samaniego, Michelle	The Interaction Between Comorbidity and Race/Ethnicity on the Diagnosis, Prognosis, and Treatment of Cutaneous Melanoma
Ortiz, Noah	Understanding the Inhibition of Growth Hormone Receptor on Breast Cancer Cells
Smith, Tyler	Cost of OR time is $46.04 per Minute
Allen, Jesse	Assessing the Role of the PSMD2 Proteasome Subunit as a Biomarker and Therapeutic Target in FLT3-Mutated Acute Myeloid Leukemia

10:30 AM – 11:00 AM

Bharucha, Het	The Interplay and Associations of the Obesity Phenotype and Metabolic Abnormalities with Allostatic Load in the United States Adult Population: NHANES 2013-2018
Amir, Omar	Investigating the role of TM4SF4 in cell proliferation and hormone secretion
Zambrano, Angelica	Endurance Exercise and Coronary Artery Calcium: What is the Link?
Shahid, Saqib	The Impact of Vitamin D on Outcomes for Hispanic Patients Hospitalized for COVID-19
Parada, Maria	Full Term Pregnancy Inhibits Breast Cancer Growth by Altering Breast Epithelial Stromal Interactions

11:00 AM – 11:30 AM

Moreno, Diana	Mechanisms of mitochondrial dysfunction in development of mismatch repair-deficient endometrial cancer
Renteria, Miguel	Human Connectome: Neuroanatomical Changes Associated with Alcohol Dependence
Tom, Kelsey	Acute and Chronic Tobacco Smoking and the Effects on Human Brain Volume using the Human Connectome Project
Astudillo, Gonzalo	What is the intracellular localization of G0/G1 switch gene 2 (G0S2) in chronic myeloid leukemia (CML)?

STUDENT ROSTERS – OCTOBER 13:

9:00 AM – 9:30 AM

Yarlagadda, Bina	The Effect of Zip Code-Based Poverty Rates on Quality of Communication and Patient Healthcare Satisfaction among Patients of Outpatient Clinics in El Paso County, Texas
Ambe, Regina	BCG modulates human dendritic cells response to SARS-CoV-2 S-glycoprotein
Nguyen, Nhu	A Role for G0/G1 Switch Gene 2 (G0S2) in Normal and Malignant Myeloid Differentiation
Farsi, Soroush	Knockout of PD-L1 promotes immune system evasion in human glioblastoma cells
Petersen, Cyrena	Characteristics of Acute Lymphoblastic Leukemia in Hispanic Population in El Paso and Risk of Treatment-Related Complications
Mauntana, Shielah	Analysis of Hospitalizations for Ischemic Colitis in the U.S.

9:30 AM – 10:00 AM

Kishore, Eshani	The effects of histamine (H2) blockers and proton pump inhibitors on COVID-19 patients.
Kawai, Tetsuyuki	Initial Assessment and Comparison of Competency, Attitudes and Knowledge of Palliative Care amongst Physician at Different Stages of Training
Gambini, Sabrina	How self-perceived quality of sleep is affected by brain stem volume
Nguyen, Amy	Evaluating the level of evidence for different non-opioid modalities in pain management for post-knee and hip surgery
Assi, Heabah	Effects of an Exclusive Human Milk Diet on Enteral Feeding Outcomes of Neonates with Congenital Gastrointestinal Disorders
Bradley, India	High prevalence of compensatory hyperinsulinemia in U.S. teenagers: The 2015-2018 National Health and Nutrition Examination (NHANES)

10:00 AM – 10:30 AM

Chaudhry, Shahrukh	NF-κB activation in Human microglial cells upon Borrelia infection
Nhim, Vutha	Effects of race-ethnicity and country of origin on incidence and survival in breast cancer
Mackie, Tayler	Importance of Subjective SES and Neighborhood Disadvantage for Adolescents with Type 1 Diabetes
Ali, Sania	HPV Self Sampling and the Health Belief Model
Olivares, Jocelyn	Phytochemicals as Treatment Options for Hepatocellular Carcinoma
Gardner, Joshua	Igniting children's enthusiasm for microbes with an origami paper microscope

10:30 AM – 11:00 AM

Ogbutor, Chinodebem	A mediation analysis of maternal smoking, gestational age, and birth weight in a predominantly Hispanic population on the US-Mexico border
To, Quang	How can anime be used as a fun way to teach host-pathogen interactions in microbiology
Manohar, Nivethitha	Preparing Health Professions Students for Culturally Sensitive Practice
Helmsdoerfer, Kristen	The Effects of Acute Kidney Injury and COVID-19 in a Hispanic Population

11:00 AM – 11:30 AM

Raynor, Mark	Utility of Aspirin and Acetaminophen Serum Levels as Routine Screening in Psychiatric Admissions

ABSTRACTS
October 12
9:00 a.m. – 12:00 p.m.

The Effects of Prior Pregnancy on the Risk of Breast Cancer
Lily Sebastian (MS2)
Mentor: Dr. Rajkumar Lakshmanaswamy
Group 1 10/12/2022 9:00 a.m.

Abstract
The development of breast cancer in women is a great risk that threatens female reproductive health today. Parity has been inversely linked to the development of breast cancer, especially early pregnancy. There are various mechanisms by which parity can confer protection against tumor development, including the roles of microRNAs and stem cells, which is what this project focused on. Moreover, to generate data for this project, RNA was extracted from mammary tissue of both parous and nulliparous rats, with the nulliparous group serving as the control. The extracted RNA was turned into cDNA, and this cDNA was then used to run realtime PCR to quantify miRNA and stem cell gene expression in parous tissue versus nulliparous tissue. In the analysis, it was found that parity does indeed affect the expression of both miRNAs and stem cell singling genes as many tumor suppressive and oncogenic genes were either upregulated or downregulated in the parous group in comparison to the nulliparous group. All in all, these findings are of great importance because of their impact on how to treat chronic conditions like breast cancer and all the moving pieces involved in its diagnosis, management, and treatment. Through analyzing the results of this project, it had become evident how pregnancy can be protective against the development of breast cancer, but there is still more work to be done on how to best use this information in OB/GYN and oncology clinics around the world to better prevent and treat this condition. By doing this project, I learned so much about how to properly set up and carry out a complex research project from start to finish, and I look forward to doing more research throughout the rest of my medical school career. I was able to gain valuable knowledge on the process of developing scientific knowledge outside of the clinical side of medicine and how both researchers and clinicians can work together to deliver the best health care possible to our community.

Novel non-ATPase proteosome subunits as biomarkers and targets in FLT3+ acute myeloid leukemia (AML)

Boranai Tychhon (MS2)
Mentor: Dr. Anna M. Eiring
Group 1 10/12/2022 9:30 a.m.

Abstract

Acute myeloid leukemia (AML) is a highly aggressive cancer affecting children and adults. Despite a meager survival rate of less than 25% in 5 years, AML therapy remained unchanged for nearly four decades. In particular, AML patients suffer from drug resistance, relapse, or complications associated with chemotherapy (e.g., infection). AML prognosis varies depending on deleterious mutations that contribute to the resistance of many different treatment options. One of the most common mutations in AML is FMS-like tyrosine kinase (FLT3), which regulates cell proliferation and survival. This novel therapeutic approach can lead to mutations that confer resistance to chemotherapy. In contrast, others focus on a new system that regulates cellular degradation and apoptosis, like the ubiquitin-proteasome system (UPS). Previously, the Eiring lab identified two subunits of the UPS, PSMD1 and PSMD3, that play roles in cell survival and drug resistance of myeloid leukemia and other solid tumors. Therefore, we hypothesized that different UPS subunits have prognostic implications in AML and can serve as new therapeutic targets or biomarkers. Using publicly available data from The Cancer Genome Atlas (TCGA) database, we identified that the expression of mRNA encoding PSMD2, PSMD7, and PSMD9 are elevated in AML patients with mutant versus wild-type FLT3, which correlates with worse overall survival. In the current study, I focused on assessing the phenotypic role of the PSMD9 subunit in FLT3-mutated AML, and whether it could serve as a novel target for therapy.

The Effect of Early Family Intervention in Children At-Risk for Severe Mental Illness

Paulette Orhii (MS3)
Mentor: Dr. Sarah L. Martin.

Group 1 10/12/2022 10:00 a.m.

Abstract

Bipolar disorder and schizophrenia are categorized as severe mental illnesses in early adulthood; but may present as mood and sleep disturbances and/or first episode psychosis as early as childhood (1-4). Bipolar disorder, which affects about 2.5 percent of the population (National Institute of Mental Health, 2020), is characterized by episodes of mania and depression (American Psychiatric Association, 2013). Schizophrenia is much less common, only affecting less than one percent of the population (National Institute of Mental Health, 2022), and presents with symptoms such as delusions, hallucinations, and/or disorganized speech and movements lasting longer than 3 months (American Psychiatric Association, 2013). While bipolar disorder and schizophrenia differ in presentation and neurodevelopmental origin (5), both are severe mental illnesses with overlapping risk factors and detrimental effects on behavioral and familial functioning (6).

The cause of severe mental illness is unclear, but data suggests that both environmental and genetic factors play a role. Some studies have linked bipolar disorder and schizophrenia to risk factors such as obstetric complications (7), neurocognitive developmental deficits (8-10), and maternal absence (11, 12). Notably, extensive data has shown that adverse childhood experiences (ACEs) are positively correlated to the development of severe mental illness (11, 13-16). Family history of severe mental illness is also a strong predictor of mood and disruptive disorders (17, 18), and the presence and progression of severe mental illness (3, 19): As many as one third of children with parents with bipolar disorder developed the condition (20), and affected children of parents with severe mental illness tend to present similarly in age of onset and severity (21). Furthermore, late diagnosis and treatment of severe mental illness and lack of social support correspond to increased duration, severity, and suicidality (2, 22, 23).

Early identification of risk factors (24, 25), family intervention (26-28), and familial support (29) are crucial to preventing the development and progression of severe mental illness in children with affected first degree relatives. However, few studies have conducted randomized early family interventions to assess their effectiveness in severe mental illness in Latino children. We hypothesized that early family intervention can improve outcomes in children with first degree relatives with bipolar disorder and schizophrenia in the Hispanic/Latino population.

The Interplay and Associations of the Obesity Phenotype and Metabolic Abnormalities with Allostatic Load in the United States Adult Population: NHANES 2013-2018

Het Bharucha (MS3)
Mentor: Dr. Alok Kumar Dwivedi
Group 1 10/12/2022 10:30 a.m.

Abstract

Background:

An increased allostatic load, a measure of the overall accumulation of stressors on one's body, has been known to be associated with adverse health outcomes and higher all-cause mortality. Similarly, the obesity phenotype and the metabolic syndrome are also known to confer these detrimental outcomes. Research regarding the relationship between these three entities will help physicians to better understand the major factors that contribute to individual health.

Objectives:

This study was designed to investigate (a) whether there is an association between the obesity phenotype/metabolic abnormalities and allostatic load after excluding metabolic components that are involved in developing allostatic load scores, (b) the presence or absence of the obesity paradox with regards to stress.

Methods:

Pooled data from the 2013-2018 National Health and Nutrition Examination Survey was used to compare allostatic load scores in adults aged 18 or older with varying obesity and metabolic parameters. The allostatic load was defined using the following parameters: systolic blood pressure, diastolic blood pressure, 60-second pulse, serum albumin, high-density lipoprotein (HDL), total cholesterol, c-reactive protein, and creatinine clearance after excluding body-mass index (BMI), peak expiratory flow, serum cortisol, dehydroepiandrosterone, epinephrine, norepinephrine, dopamine, aldosterone, interleukin-6 (IL-6), tumor necrosis factor-α (TNF-α), insulin-like growth factor-1, fibrinogen, low-density lipoprotein (LDL), glycosylated hemoglobin (HbA1c), insulin, and homocysteine. If the score is 4 or higher, the study subject is considered to have a high allostatic load. Initially, a design-based F test was used to calculate the association of socio-demographic characteristics and the primary hypothesized exposures including obesity status and metabolic abnormalities with allostatic load status. An adjusted multivariable relative risk regression model was then performed to assess the interaction and association between high allostatic load scores and obesity/metabolic parameters, while controlling for age, gender, ethnicity, socioeconomic status, and health behaviors. The results of the regression analyses were summarized with prevalence ratio (PR) along with 95% confidence intervals and p-values.

Results:

For US adults aged 18 years or older, elevated triglyceride and fasting glucose levels were strong factors (PR=2.27; 95% CI: 1.90, 2.71 and PR=1.49; 95% CI: 1.19, 187 respectively) of high allostatic load scores after adjusting for considered confounders. In the subsequent interaction model between obesity and individual metabolic abnormalities, results showed that isolated highrisk triglyceride levels conferred the highest factor acquiring a high allostatic load score (PR=3.81; 95% CI: 2.44, 5.95) after controlling for the other confounders. In the same model, fasting glucose showed a significant positive association with high allostatic load (PR=1.72; 95%

CI: 1.23, 2.42) whereas obesity on the other hand showed a much weaker association (PR=1.12; 95% CI: 0.75, 1.67). In the presence of obesity, high triglyceride and fasting glucose levels combined, showed the strongest and most positive association with high allostatic load (PR=4.30; 95% CI: 2.99, 6.17) when compared with the normal subjects.

Conclusion:

Our data suggests there does seem to be an obesity paradox with regard to stress in which obese individuals are not necessarily at a higher risk of acquiring an increased burden of chronic stress on the body. In contrast, individuals who are metabolically unhealthy, especially in terms of triglyceride levels, are much more likely of acquiring a high allostatic load. These findings have far-reaching implications on the treatment and prevention of adverse health outcomes stemming from an increased burden of stress. Lastly, the addition of triglyceride and fasting glucose levels could provide value to the varying definition of allostatic load.

Effects of COVID-19 Pandemic on FSOM MS1 Life Satisfaction, Cohort Interactions, and Education

Ritu Patel (MS3)
Mentor: Dr. Bharathi Gadad,
Group 2 10/12/2022 9:00 a.m.

Abstract

Background: Previous research has demonstrated that the pandemic negatively impacted medical students resulting in higher rates of anxiety, depression, and loneliness with decreased life satisfaction and academic motivation. The return to in-person learning provided the opportunity to compare the impact of social distancing, an online curriculum, and limited in-person interactions on the wellbeing and sense of community amongst two different cohorts of medical students at the Foster School of Medicine (FSOM) in El Paso, Texas. The aim of this study was to evaluate if the COVID-19 pandemic restrictions caused a significant negative impact on students within the cohorts of Classes of 2024 and 2025 at FSOM.

Methods: In this cross-sectional study, a secure web platform for online databases and surveys (REDCap) was used to distribute a series of online surveys regarding three dependent variables: life satisfaction, academic frustration, and cohort interactions, totaling 48 questions. The questionnaire was adapted from previous studies on the effect of COVID-19 on individuals' mental health and wellbeing. Data collection occurred between early April to late June 2022. This time corresponded to the end and the beginning of the academic year for students Class of 2024 and Class of 2025 who were exposed to differing levels of pandemic restrictions during their academic years.

Results and Discussion: The results from this study of 47 medical students (approximately 21% response rate out of 224 students) indicated that medical students at FSOM were not significantly impacted in areas of mental and emotional wellbeing, subjective feelings of familiarity toward their peers, and perceived frustrations with academic delivery. Students were significantly impacted in participation of public and social activities due to governmental and local regulations. Students at FSOM were not significantly impacted—except for their ability to participate in social gatherings and other activities—by the pandemic and its restrictions, as compared to other larger studies, which have shown significant negative impacts on medical students. These conclusions allow for greater understanding about student resiliency and adaptability, two key components of succeeding in medical school. Further research could elucidate what traits within these medical students or FSOM protected them from the significant negative impact of the COVID-19 pandemic.

Cutaneous melanoma treatment outcomes in Texas: A study of the Texas Cancer Registry/Medicare linked database

Hannah Riva (MS2)
Mentor: Dr. Jessica Chacon
Group 2 10/12/2022 9:30 a.m.

ABSTRACT

Background: Skin cancer is the most common type of cancer. Though melanoma makes up 1% of skin cancers, it is the deadliest skin cancer. While Caucasians have the highest incidence of melanoma, Hispanics make up the second most common group in the United States and in Texas. Incidence of melanoma is increasing, including in the Hispanic population. Importantly, mortality from melanoma is higher in the Hispanic than in the Caucasian population. Given that Hispanics make up a large portion of the United States, specifically in Texas, further research has been necessary to analyze the effects of treatment methods on all-cause and skin cancer mortality in Hispanic populations.

Methods: We conducted an analysis of patients with cutaneous melanoma in the Texas Cancer Registry Medicare database to assess treatment modalities used and outcomes among demographic groups from 2007 to 2018. A bivariate analysis using Chi-square, Fisher's exact test, and Student's T-Test was done to compare patient, clinical, cancer and treatment characteristics between Hispanic and Non-Hispanic White (NHW). A Cox Proportional Hazard regression analysis was performed to assess treatment effect on outcome, with race-ethnicity as an effector modifier. Models were adjusted for patient age, sex, cancer stage, primary care provider, and comorbidity.

Results: A higher percentage of Hispanic patients (7.6%) presented with a metastatic tumor stage diagnosis and cancer-related mortality (22.11%) compared to NHW patients ($p < 0.0001$). In both the Hispanic and NHW cohorts, post-diagnosis radiation (Hispanic 95% CI 0.984 – 2.634, NHW 95% CI 2.082-2.648) and post-diagnosis chemotherapy (Hispanic 95% CI 1.085-3.321, NHW 95% CI 1.664-2.489) are each associated with an increased risk in cancer-related mortality. Similar results are seen with post-diagnosis radiation (Hispanic 95% CI 1.121-2.40, NHW 95% CI 1.644-1.971) and chemotherapy (Hispanic 95% CI 0.900-2.368, NHW 95% CI 1.356-1.869) when considering all-cause mortality in both populations. However, post-diagnosis surgery (95% CI 0.571-0.678) and post-diagnosis immunotherapy (95% CI 0.032-1.565) had the opposite effect in cancer-related mortality for NHW. Cancer-related mortality for post-diagnosis surgery in the Hispanic cohort had a similar trend (95% CI 0.395-0.856), yet the effect of post-diagnosis immunotherapy was dismissed due to small sample size.

Conclusion: Our results propose differences in all-cause and cancer-only related mortality with separate treatment modalities, particularly with chemotherapy and radiation therapy. In addition, this retrospective cohort study validated that health disparities exist in the Hispanic Medicare population of Texas with cutaneous melanoma While the use of immunotherapy has steadily increased over the past decade, there has been inequitable access to treatment, which could possibly be explained by the small sample size of immunotherapy for Hispanics found in this study. Health disparities in the growing U.S. Hispanic population, especially regarding access to immunotherapy, must be addressed to improve survival outcomes among melanoma patients.

The Interaction Between Comorbidity and Race/Ethnicity on the Diagnosis, Prognosis, and Treatment of Cutaneous Melanoma

Michelle Samaniego (MS2)
Mentor: Dr. Jessica Chacon
Group 2 10/12/2022 10:00 a.m.

ABSTRACT

Background: Melanoma, the most lethal form of skin cancer, is the fifth most common cause of cancer in the United States. While melanoma is highest among the white population, Hispanics and black patients are diagnosed at an earlier age and suffer a worse prognosis. The increasing incidence of comorbid conditions among melanoma patients has made comorbidity a possible key attribute when considering prognosis, survival, and treatment. Given the sparse research on the issue of comorbidity and race in melanoma, this study aims to analyze the incidence of comorbidity among different races and to determine racial differences in the relationship between comorbidity and diagnosis, prognosis, survival rate, and treatment in melanoma patients. **Methods:** Data provided from TCR was used to derive patient, clinical, cancer prognosis, and treatment characteristics. Melanoma patients were compared based on ethnicity, race, and vital status using an unpaired-t-test, Wilcoxon rank sum test, Chi-square test, and Fisher's exact test. A Kaplan-Meier curve was conducted to examine the probability of survival based on ethnicity and comorbidity status. Univariate and multivariable cox regressions were performed to determine survivability when at least one comorbid condition was present. Data was analyzed using Stata V17. **Results:** Hispanic and black patients had a younger mean age at diagnosis compared to the non-Hispanic and white populations, respectively (56.17 and 50.69 years vs. 60.21 and 60.25 years, respectively, p-value<.001); they also suffered from greater malignancy (86.24% and 94.30% vs. 72.94% and 72.90%, respectively, p-value<.001), distant metastasis (10.80% and 14.37% vs. 5.30% and 8.23%, respectively, p-value<.001), and thus a shorter mean survival time (5.50 and 5.33 years vs. 6.75 and 6.67 years, respectively, p-value<.001). In addition, Hispanics and black patients had a higher incidence of comorbidity (9.354% and 10.24%, respectively, in comparison to non-Hispanics (6.98%) and white patients (6.95%) (p-value<.001); both Hispanics ((38.64%) and black patients (42.19%) had higher mortality rates as well (p-value<.001). As shown by the Kaplan-Meier survival curve, patients with a history of comorbidity had a lower chance of survival. After adjusting for gender, ethnicity, race, insurance, therapies (hormone, immunotherapy, chemotherapy, radiation) and tumor behavior, risk of mortality increased by 41% when at least one comorbid diagnosis was (95% CI, 1.34-1.48, p-value<.0001). Racial differences in survival were seen when no comorbidities were present as well as when at least one condition was present; as the risk of survival for black patients increased from 2.78% to 4.00%, while the risk decreased in the white population 1.48% (p-value<.014). **Conclusion:** This study demonstrated similar trends in diagnosis, prognosis, and survival between Hispanic, white, and black patients as previous research. Both Hispanics and black patients carried higher instances of comorbidity, which proved to be a contributing factor to a poorer prognosis, as shown by the increase risk of mortality. This study solidified the need for further research on the influences of comorbidity on melanoma to improve the health outcomes and disparities among various racial/ethnic groups.

Investigating the role of TM4SF4 in cell proliferation and hormone secretion

Omar Amir (MS2)
Mentor: Dr. Dean Danielle

Group 2 10/12/2022 10:30 a.m.

ABSTRACT

Objective/Hypothesis: Interrupting glucagon receptor signaling results in hyperaminoacidemia, which stimulates pancreatic alpha cell hyperplasia. Arginine, a potent secretagogue for both insulin and glucagon, is required for hyperaminoacidemia-stimulated alpha cell proliferation. To understand the mechanism of arginine-stimulated proliferation, the researcher performed *in vitro* knockdown experiments of Transmembrane 4 L Six Family Member 4 (*TM4SF4*), a putative arginine binding protein highly expressed in alpha cells, using small interfering RNA (siRNA) to detect alterations in cellular proliferation.

Approach: The researcher delivered siRNA into HepG2 cells through transfection with Lipofectamine RNAiMAX. Once knockdown of the siRNA- targeted was confirmed, cell viability and proliferation were analyzed 0, 3, 5, and 7 days post-transfection using the trypan blue dye exclusion assay.

Results: Here, the researcher presents data indicating that *TM4SF4* siRNA knockdown does not alter cell proliferation. However, the timeframe and level of protein changes have not been determined conclusively post siRNA transfection. The data indicate that the relative expression level of *TM4SF4* is lowest on day 3 post-siRNA transfection. The researcher also found the expression of *TM4SF1*, a paralog of TM4SF4, in HepG2 cells.

Summary/Conclusions: Taken together, these data indicate that other members of the Tetraspanin superfamily, namely *TM4SF1*, may be able to compensate for the knockdown of *TM4SF4* by upregulating their gene expression. Therefore, targeting other members may be necessary to understand the role of these proteins in cell proliferation.

Higher Incidence of Proximal Extension of the Ligamentous Disruption in Adolescents Lisfranc Injuries

Aden Springer (MS3)
Mentor: Dr. Ahmed Thabet-Hagag
Group 3 10/12/2022 9:00 a.m.

Abstract

Lisfranc injuries are commonly under-diagnosed, and are not well known among healthcare providers. Especially amongst the adolescent population. This research project's aim is to bring light to the pathology of the Lisfranc injury in adolescent patients and to see if there are any unique distinctions between adults versus adolescents, as well as assess the surgical treatments.

This project was a retrospective study of adolescent patients between 10-18 years who had suffered a Lisfranc injury, and undergone operative management at a level 1 trauma center during 2012-2019. Nine patients met the inclusion criteria for the study, with a mean age ofo 15.4 years old, 5 of which were male, and 4 of which were female. The mean follow-up time was 9.5 months. All cases were full union and only 2 cases had two minor complications related to the implants used. Six out of nine cases had proximal extensions of the Lisfranc injury. Surgical treatment of these injuries included fixation between the middle cuneiform and medial cuneiform via plate or screws. There were two cases that the 1st tarso-metatarsal joint was not affected, in contrast to the adult Lisfranc injuries. In conclusion these results may show that the Lisfranc injury may have a different pathology to that of the adult Lisfranc injury, that would involve a proximal extension of the injury site. Regardless of the results Lisfranc injuries are commonly underdiagnosed and there needs to be more awareness of it and more research in order to improve patient outcomes.

Immunotherapy treatment disparities: a TCR analysis of patients with melanoma in the state of Texas

Fabiola Ramirez (MS2)
Mentor: Dr. Jessica Chacon
Group 3 10/12/2022 9:30 a.m.

Abstract

Background: As the deadliest form of skin cancer, advanced-stage melanoma is a devastating disease. Although the 5-year survival rate for early-stage disease is 99%, it drops to only 30% once the disease has metastasized. Encouragingly, after the introduction of systemic immunotherapy, the overall survival of metastatic melanoma has improved drastically. Immunotherapy is showing superior survival outcomes for patients with advanced stage melanoma, but access to novel immunotherapeutic drugs is not universal for all patients. Herein, we examined the association between various sociodemographic and economic factors and the likelihood of using immunotherapy for the treatment of melanoma in the state of Texas.

Patients and Methods: In this retrospective cohort study, data from the Texas Cancer Registry for the years 2011-2018 was analyzed. The study population included 35963 patients, 18 years and older, diagnosed with cutaneous melanoma in the state of Texas. As a primary study outcome, multivariable regression analysis was done to evaluate the association between patient characteristics and likelihood of receipt of immunotherapy. Covariates included sex, race, ethnicity, insurance status, poverty level, and proximity to border region. As secondary outcomes, the association between sociodemographic factors and likelihood of presentation with metastasis at diagnosis was examined. Finally, subgroup analysis evaluated general trends between Hispanic and non-Hispanic patients with melanoma.

Results: A total of 933 patients underwent immunotherapy. Having metastasis at diagnosis was strongly associated with higher odds of receiving immunotherapy (penalized adjusted OR 28.690, 95% CI 23.470-34.350, p< .0001). Compared to having private insurance, patients were less likely to receive immunotherapy if they were uninsured, had Medicare, or had missing/unknown insurance status (penalized adjusted OR's 0.700, 0.790, 0.130, p = 0.026, 0.027, and p < .0001 respectively). Hispanic ethnicity did not show a statistically significant association with likelihood of receipt of immunotherapy. Results from our multivariate model highlighted several factors associated with a higher likelihood of presenting with metastatic disease which included Hispanic ethnicity, black race, having no insurance, having Medicare, and belonging to the 10-20% and the 20-100% poverty level groups (p <0.05 for all). When compared to NHW's, Hispanics with melanoma in Texas demonstrate a higher level of poverty, increased risk of metastasis at diagnosis, as well as higher likelihood of being uninsured and living in a border region (p < 0.001 for all).

Conclusions: Immunotherapy has revolutionized the treatment of melanoma. As new immunotherapy drugs reach the market, disparities in utilization of immunotherapy are expected to increase. With this retrospective cohort study, we add to the growing body of evidence recognizing insurance status as a barrier to treatment with immunotherapy. Dermatologic health disparities affecting the Hispanic population of Texas underscore the importance of targeted interventions to overcome community level barriers to melanoma diagnosis and care. Finally, this study highlights the need to further evaluate different insurance types and their effect on receipt of immunotherapy.

Understanding the Inhibition of Growth Hormone Receptor on Breast Cancer Cells

Noah Ortiz (MS2)
Mentor: Dr. Rajkumar Lakshmanaswamy
Group 3 10/12/2022 10:00 a.m.

Abstract

Breast cancer is the most diagnosed cancer in women. Of the cancer subtypes, Triple-Negative Breast Cancer (TNBC) is often associated with poor prognosis due to its limited treatment options. TNBC is aggressive and has a short survival time because it lacks estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor-2 (HER2). TNBC is frequently diagnosed in obese women and has a poor prognosis. Studies have shown that growth hormone receptor (GHR) is upregulated in TNBC and is associated with increasing pro-tumor mechanisms. Therefore, GHR poses as a potential therapeutic agent as its suppression can lead to decreased expression of genes related to tumor growth, proliferation, and metastasis. TNBC malignant cell line MDA-MB-231 was treated with GH. Analysis constituted results that supported the role of GH in upregulation of genes that aid in cellular processes leading to growth and proliferation. The results also showed that genes that promoted inflammation, anti-metastasis, and apoptosis were downregulated. GHR-targeted therapy can prove to be beneficial in TNBC treatment options. More studies need to be done to analyze the effects of GHR suppression in breast cancer patients.

The MDA-MB-231 TNBC malignant cell line was treated with GH for 24 hours before being analyzed in a human obesity PCR-based array to compare several genes implicated in the relationship between TNBC and obesity. RNA extraction was used to quantify the purity and concentration of RNA before synthesizing cDNA. cDNA was then used to perform a real-time PCR. PCR analysis results demonstrated the upregulation of genes that were involved in pro-tumor mechanisms like growth, proliferation, and evasion of the immune system and downregulation of genes associated with apoptosis and suppression of tumorigenesis. This implies that GHR has a significant role in TNBC maintenance and can pose as a potential target for future therapies.

Endurance Exercise and Coronary Artery Calcium: What is the Link?

Angelica Zambrano (MS2)
Mentors: Dr. Jeffery Hsu, Dr. Linda Demer, and Dr. Yin Tintut
Group 3 10/12/2022 10:30 a.m.

Abstract

Routine exercise and physical activity are well-recognized to reduce the risk of cardiovascular disease. While physical activity improves cardiovascular risk profiles through the attenuation of traditional atherosclerotic risk factors, recent studies have provided new insight into the association between high volumes of physical activity and increased levels of coronary artery calcium. Coronary artery calcium can be utilized as an indicator of coronary artery disease due to its high fidelity in predicting plaque burden and future cardiovascular events. A multitude of recent studies investigating the association between coronary artery calcium and high volumes of lifetime physical activity have revealed both an increased prevalence and severity of subclinical coronary artery plaques within older male endurance athletes. These athletes appear to have significantly higher coronary artery calcium when compared to less active cohorts—with the highest volume physical activity groups demonstrating the greatest prevalence of coronary atherosclerosis. Interestingly, the plaques isolated from these athletic cohorts are predominantly comprised of calcium and appear to confer a stable phenotype that is more resistant to rupture and thrombosis than plaques of mixed morphology. Importantly, despite significant elevations in coronary artery calcium, these endurance athletes do not experience increased incidence of cardiovascular disease or all-cause mortality. The presence of these subclinical plaques, coupled with the unique calcified morphology, may suggest a novel atherogenic process among elite athletes that confers enhanced plaque stability. While the precise mechanisms of plaque pathogenesis within this athletic population remain unclear, it is thought that mechanical stress, exercise-induced parathyroid hormone release, inflammatory mediators, oxidative stressors, or testosterone could be potential mediators of atherogenesis. This paper will thus discuss the association between coronary artery calcium and high-volume endurance exercise, the potential atherogenic mechanisms underlying elevated coronary calcium, and the clinical implications and recommendation for those at risk. Additionally, we will also assess the relationship of prodigious exercise on cardiac functionality of hyperlipidemic mice exposed to a progressive 9-week exercise regimen.

Human Connectome: Neuroanatomical Changes Associated with Alcohol Dependence

Miguel Renteria (MS2)
Mentor: Dr. Hugo Sandoval

Group 3 10/12/2022 11:00 a.m.

Abstract

It is well known that changes in brain anatomy can result in behavioral changes, memory loss, and neuro-cognitive deficits, and is influenced by various risk factors such as alcohol dependency. Therefore, determining a relationship between alcohol dependence and the degree of brain changes can assist in diagnosis, predict disease severity, and suggest treatment or course of action. A retrospective analysis on the de-identified dataset from the Human Connectome Project was conducted to determine if there is a volumetric difference in the third ventricle, hippocampus, and cerebellum between alcohol dependent subjects and subjects with no history of alcohol dependence. Volumetric brain parameters were compared between 866 subjects, consisting of 817 controls (497 males, 320 females) and 49 alcohol dependent subjects (34 males, 15 females). Statistical analysis did not show a significant difference in any of the volumetric brain parameters of interest between alcohol dependent subjects and subjects with no history of alcohol dependence. Subgroup analysis showed a significant difference in all volumetric brain parameters between genders, and for select brain parameters between age ranges 26-30 and 31-35, regardless of alcohol dependence group. These findings warrant future neuroscience research to account for gender differences and age range and should include length and severity of alcohol dependence to further understand the effects of alcohol dependence on neuroanatomy.

Team Sport Participation in Wheelchair Athletes Positively Impacts Neurocognitive Function

Misbah Jilani (MS3)
Mentor: Dr. Michael Cottingham and Dr. Stephanie Tow
Group 4 10/12/2022 9:00 a.m.

Introduction

Executive functions are the mental processes required to perform daily tasks, while neurocognitive ability describes these mental processes as they relate to specific structures in the brain. Neurocognitive impairments may coexist with physical disabilities, and there is an associated effect on mortality for those who have cognitive dysfunction as well as a physical disability (Yu, 2017). Moreover, research has shown an increased risk of cognitive impairment in individuals with physical disabilities secondary to traumatic brain injuries, spinal cord injuries, amputations, and neural infections (Sachdeva et al., 2018; Plinta et al., 2005). However, research also shows that exercise can improve neurocognition by increasing the size of the hippocampus in adulthood, as well as increasing both gray and white matter concentrations in brain regions involved with visuospatial function, motor control, and working memory (Tseng et al., 2013; Erickson et al., 2011). Exercise, unsurprisingly, has many beneficial effects on individuals with physical disabilities; significant evidence supports that exercise can decrease anxiety and depression, increase self-esteem, and enhance social support, to name a few (Sheppard, 1991). Despite that, the impact of exercise on objective changes in neurocognitive function, and therefore executive function, in those with physical disabilities is limited. Gaining a better understanding of this relationship can help improve the quality of life for those with physical disabilities, as executive functions are crucial for both activities of daily living (ADLs) and instrumental activities of daily living (IADLs).

ADLs and IADLs are skills that are necessary for independence and a good quality of life. IADLs are activities like cooking and managing finances, while ADLs involve basic functions of living like feeding and bathing. Intact cognition is even more important for IADLs as these require more complex cognitive processes. Since those with more severe physical disabilities may have increased dependence on others to accomplish their ADLs/IADLs, this population may also stand to benefit most from the positive impacts of physical activity, both physically and cognitively. Exercise has shown to improve cognitive function among those with neurocognitive disabilities such as dementia, Down syndrome, Parkinson's disease, and attention-deficit/hyperactivity disorder, yet more research needs to be completed on its impact on those with physical disabilities that do no directly lead to neurocognitive dysfunctions (Ptomey et al., 2018; Rupinder et al., 2019; Ya-Shuo et al., 2020; Den Heijer et al., 2017).

The CogniFit Cognitive Assessment Battery was utilized for this study. This assessment measured five primary neurocognitive domains: attention, memory, coordination, perception, and reasoning, via online mental games (CogniFit). These domains are essential as they are often required in team sports. Dysfunction in any of these core categories can lead to challenges in everyday life. Although research has supported that exercise may improve cognitive function in people with neurocognitive disabilities, there is limited research on the effect of exercise or team sport participation on neurocognitive function in people with physical disabilities that do not directly cause neurocognitive impairment disabilities. This study aimed to assess the effects of team sport participation on total neurocognitive ability in people with physical disabilities via five neurocognitive domains: attention, memory, coordination, perception, and reasoning. We hypothesized that team sport participation would lead to improvement in total neurocognitive functions, which in turn could improve executive function required for ADLs and IADLs.

Neuroanatomical Differences in Cannabis Users from the Human Connectome Project

Seth Smith (MS2)
Mentor: Dr. Hugo Sandoval
Group 4 10/12/2022 9:30 a.m.

Abstract

Cannabis use is seeing a rapid rise in legalization and prevalence, especially among adolescents and young adults. Much has been studied regarding the relationship between cannabis and neuropsychological, socio-behavioral, neuroanatomic, and neurofunctional outcomes. Identification of neuroanatomic changes in cannabis use have been remarkably heterogenous. The current study seeks to contribute to the literature on neuroanatomic changes in cannabis use by using secondary data from the high-powered NIH sponsored Human Connectome Project. In this study, we find a significant negative correlation between cannabis use and bilateral amygdala volume, left hippocampal volume, bilateral entorhinal cortex average thickness, and left lateral and right medial orbitofrontal average thickness. Our results are largely consistent with previous literature, although changes in the amygdala may indicate a previously underappreciated connection with cannabis use and could inform research regarding emotional regulation in cannabis users.

Cost of OR time is $46.04 per Minute

Tyler Smith (MS3)
Mentor: Dr. Benjamin Childs

Group 4 10/12/2022 10:00 a.m.

Abstract

Rising costs in the surgical theatre have necessitated the implementation of value-based practice to maximize quality of surgical care, while minimizing cost to the patient. Value based care influences the treatment plan by taking into consideration patient quality of life and overall outcomes. Although there are many ways to assess costs of running an operating room, there exists no gold standard used throughout the field of surgery, making strategies to cut costs convoluted. An emerging strategy of measuring costs of running an operating room is by using the cost per minute of operating room time. Although many institutions use cost per minute, there is very little consistency of exactly what is included in that cost, resulting in widely variable costs per minute. The purpose of this study was to establish a consensus estimate of operating room cost per minute by performing a review of currently published literature. Literature research of “operating room cost per minute” yielded 51 articles with 14 of those with their own unique estimates for operating room cost per minute. We found the average cost per minute was $46.04 with a standard deviation of $32.31. There was minimal consistency in methodology across articles, which reflects the large range of values we obtained for cost per minute of operating room time. It is crucial for surgical institutions to adopt cost per minute of operating room time in order to be able to more easily compile data and make the operating room more efficient, passing savings onto payers and patients.

The Impact of Vitamin D on Outcomes for Hispanic Patients Hospitalized for COVID-19

Saqib Shahid (MS3)
Mentor: Dr. Fatma Dihowm

Group 4 10/12/2022 10:30 a.m.

Abstract:

Background/Goals

The SARS-CoV-2 novel coronavirus that causes COVID-19 has been shown to affect individuals more severely with underlying conditions, such as metabolic syndrome or diabetes. This is a reason why SARS-CoV-2 more severely affects populations at risk for these conditions, notably the Hispanic population. Vitamin D has been shown to be a positive immunomodulatory actor, shown to upregulate production of CAMP (cathelicidin antimicrobial peptide) and its effect on mitigating the severity of respiratory illnesses has been widely studied. Additionally, given vitamin D's role in the functional regulation of pancreatic beta cells, this study aims to determine whether vitamin D plays a significant role in providing better outcomes for Hispanic patients with diabetes who have been infected with COVID-19.

Methods

We collected data from the charts of 1,478 Hispanic patients who were hospitalized for COVID-19 at University Medical Center El Paso. Comparisons were made between patients who received Vitamin D therapy (705) and those who did not (773). The main outcome that was assessed was mortality, as well as secondary outcomes such as length of hospital stay, need for supplemental oxygen upon discharge, and ICU admission. Further comparisons were made between patients who suffer from diabetes and those who do not.

Results

Univariate analysis results show a significant reduction in mortality risk (Relative Risk = 0.623, $p<0.0001$) in patients who received Vitamin D as part of their treatment compared to those who did not. Multivariate analysis results also show a significant reduction in mortality risk for patients treated with Vitamin D (Relative Risk = 0.55, $p<0.0001$). Additionally, univariate analysis of diabetic patients treated with Vitamin D reveals a significant reduction in mortality risk (Relative Risk = 0.49, $p<0.0001$).

"Acute and Chronic Tobacco Smoking and the Effects on Human Brain Volume using the Human Connectome Project"

Kelsey Tom (MS2)
Mentor: Dr. Hugo Sandoval
Group 4 10/12/2022 11:00 a.m.

Abstract Purpose: To understand which brain parts show significant increases or decreases in the brain volume or thickness due to acute and chronic smoking in comparison to the nonsmoking control. Methods: Data will be drawn from subjects taken from the Human Connectome Project and placed into 3 groups: nonsmoking control, acute smoking group, and the chronic smoking group. Each group will have 40 subjects ranging in ages 22 to 37 with an average age of 29, and each group will be identified by criteria set forth in the Fagerstrom Test for Nicotine Dependence. This paper also seeks to see if there are significant differences in the volumes of brain structures between people who meet the DSM criteria for tobacco dependence with difficulty quitting smoking compared to those who meet the DSM criteria for tobacco dependence with no difficulty quitting smoking. The subjects in these two categories will also be aged 22 to 37 with an average age of 29 and were also part of the Human Connectome Project. Results: There is significant difference in thickness and volume of the left and right insula between those who had difficulty and those who did not have difficulty quitting smoking. Mean differences reflected greater thickness 3.055mm and volume 2384.027mm3 in the group who had no difficulty quitting as opposed to the chronic smokers who had difficulty quitting, with thickness 3.013mm and volume 2273mm3. As for the right hippocampus, mean difference in volumes were found to be significantly greater in the group (4560.298mm3) who had no difficulty quitting compared to the chronic smoking group (4409.919mm3) who had difficulty quitting. The other brain structural volumes in the thalamus, nucleus accumbens, amygdala, and left hippocampus did not have significant differences. Conclusions: The right hippocampus and the right and left insula were found to be significantly decreased in size in chronically addicted smokers compared to smokers who had no difficulty in quitting. It is hoped in future studies that other radiological modalities and a larger sample size can be utilized to examine how the thalamus, nucleus accumbens, amygdala, and left hippocampus are also affected by chronic smoking.

The Sensitivity of Lysenin Voltage-Gating Channel to Host Electrolyte's Concentration Gradient

Qusay Alfaori (MS2)
Mentor: Dr. Radwan Al Faouri, The University of Arkansas, Fayetteville
Group 5 10/12/2022 9:00 a.m.

Abstract

Lysenin is a pore-forming toxin that is extracted from an earth worm named *Eisenia fetida* and self-inserts open channels into sphingomyelin containing membranes. Lysenin is known to be voltage and ligand regulated. An electrostatic surface representation of the Lysenin monomer showed a distribution of fixed charges revealing additional physical features of the channel structure.

However, the process of voltage-gating Lysenin channel is still not fully discovered. Therefore, the aim of this project was to further investigate the influence of changing the Lysenin channel's surrounding electrolyte solution concentration on the process of voltage-gating Lysenin channel.

The experiments were conducted via using a bilayer lipid membrane (BLM) model to host Lysenin channels. The BLM was composed of a lipid solution containing a 10:5:5 weight ratio of Asolectin, Sphingomyelin, and Cholesterol, respectively, dissolved in n-decane. Lysenin protein channel formation was monitored by measuring the ionic currents through the BLM in voltage clamp conditions (-60 mV bias potential, 1 kHz low pass hardware filter). Stepwise insertion of pores was observed with a steady state open current signifying the completion of channel insertion.

The BLM model was submerged in different solutions of aqueous *KCl* with concentrations ranging from 200 to 25 mM. Starting with a concentration of 200 mM *KCl*, the concentration was reduced by steps of 50 mM until reaching a concentration of 25 mM *KCl* (all buffered with 10-20 mM HEPES to maintain a pH of 7.0 and was used as a supporting electrolyte to observe the bilayer formation and Lysenin insertion). For each concentration of the electrolyte solution that is (200mM to 25mM *KCl*) and after achieving a stable open current (the total current through all the channels), the system was given enough time and allowed to equilibrate to start the recording of the current-voltage (I-V) curve, which demonstrates, after further data processing techniques, the electrical activities through the Lysenin channels.

Moreover, one of the most important performed experiments was to observe the behavior of Lysenin channels when they are forced to close. A set of different experiments was conducted where Lysenin channels were forced to switch from their open state (in the negative conductance) to their closed state (rectification). Aside from Lysenin's ability to translocate mono- and multivalent ions, Lysenin has been utilized in translocating DNA segments and peptide hormones, such as Angiotensin II.

Accordingly, this project aimed to contribute to better understanding of the voltage gating process of Lysenin by inspecting the voltage-gating mechanism for various concentrations of Potassium Chloride (*KCl*) aqueous solutions. Ultimately, better understanding of the voltage gating mechanism of Lysenin will allow for better utilization of Lysenin, in biological systems, as a nondestructive, self-inserting cellular membrane pore, which can be utilized in nano-vehicle drug delivery applications.

Obesity in Predominantly Hispanic Children at the US-Mexico Border Before, During, and After the COVID-19 Pandemic

Caroline Khong (MS2)
Mentor: Dr. Sarah L. Martin
Group 5 10/12/2022 9:30 a.m.

Abstract

The COVID-19 pandemic has caused negative health outcomes, strained economies, and many school closures. As pediatric obesity has become a growing health concern in the United States, it is important to consider the current pandemic's effect on children's health as well as other factors contributing to the increasing prevalence of pediatric obesity. This study was performed to investigate the prevalence of obesity in children at the US-Mexico border, where there is a largely Hispanic population, before, during, and after the COVID-19 pandemic-related school closures. A total of 67,843 pediatric electronic medical records were evaluated. The retrospective analysis included age, Body Mass Index-for-age percentile (BMI), gender, ethnicity, primary language, and insurance status. Records obtained and dated before March 13, 2020 marked the pre-pandemic period, while those obtained and dated after August 2, 2021 marked the post-pandemic period. Between the pre-pandemic period and post-pandemic period, the pediatric patients showed a significant increase in BMI. The present study highlights the need to further explore how pandemic-related effects have contributed to the rising prevalence of pediatric obesity in order to develop focused interventions and to expand investigations to unique geographic locations to examine children's overall health.

Assessing the Role of the PSMD2 Proteasome Subunit as a Biomarker and Therapeutic Target in FLT3-Mutated Acute Myeloid Leukemia

Jesse Allen (MS2)
Mentor: Dr. Anna M. Eiring
Group 5 10/12/2022 10:00 a.m.

Abstract

The proteasome is an organelle essential for intracellular protein turnover, and their regulation of protein degradation plays a key role in cellular metabolism. Cancer is a disease that typically has dysregulated metabolism to accommodate increased growth demands, and changes in proteasome regulation have been implicated as a factor in this process. These findings have led to proteasome inhibitors for cancer treatment, which have had significant success for certain cancers. However, proteasome inhibitors have problems with resistance, relapse, and side effects, so there is a need to research more specific inhibitors for the proteasome that will increase efficacy and decrease side effects. The Eiring lab has already begun this search by investigating proteasome 19S regulatory subunits PSMD1 and PSMD3 in chronic myeloid leukemia (CML), and found that knockdown of either protein increased apoptosis of therapy-resistant CML cell lines and patient samples. Further research in acute myeloid leukemia (AML) found that high PSMD3 expression correlated with decreased survival in AML patients, and knockdown of the subunit *in vivo* increased apoptosis and decreased colony formation of AML cells. Due to the results with PSMD1 and PSMD3, we hypothesized that other 19S regulatory subunits could also be involved, and chose to look at PSMD2 expression within FMS-like tyrosine kinase 3 (FLT3) mutated AML. Findings from this project include high PSMD2 expression correlating with worse survival in patients with AML, especially AML with mutations in the FLT3 gene. Knockdown of PSMD2 in the FLT3 mutated MOLM-13 AML cell line decreased colony formation but had no effect on apoptosis. This data suggests that PSMD2 inhibition will not be the magic bullet for FLT3 mutated AML treatment, but it does warrant more studies to fully understand the role PSMD2 plays in decreased survival of patients with FLT3 mutated and non-mutated AML.

Full Term Pregnancy Inhibits Breast Cancer Growth by Altering Breast Epithelial Stromal Interactions

Maria Parada (MS2)
Mentor: Dr. Rajkumar Lakshmanaswamy
Group 5 10/12/2022 10:30 a.m.

Abstract

Breast cancer is the most common type of cancer seen in women worldwide. It has been shown that an early full-term pregnancy, specifically before the age of 30, reduces the risk of developing breast cancer later in life. While it has been shown that early pregnancy has a protective effect, the exact mechanism is unclear. Understanding this mechanism will provide a potential preventive/therapeutic strategy for breast cancer. Nulliparous and parous rats were utilized in this study to understand the epithelial-stromal interaction in mammary gland tissue. Cell dissociation was performed to separate epithelium and stromal tissue, RNA was isolated from each tissue. Using a RT2 profiler pathway focused array plate, RT-PCR was performed to study apoptotic markers. We observed that parous rats had altered expression of pro-apoptotic and anti-apoptotic genes when compared to nulliparous rats. Our study suggests that pregnancy alters the epithelium and stroma in mammary glands that influence the potential tumor microenvironment.

What is the intracellular localization of G0/G1 switch gene 2 (G0S2) in chronic myeloid leukemia (CML)?

Gonzalo Astudillo (MS2)
Mentor: Dr. Anna M. Eiring
Group 5 10/12/2022 11:00 a.m.

Abstract

Chronic myelogenous leukemia (CML) is a myeloproliferative disorder characterized by its cytogenic hallmark, the Philadelphia chromosome, which results from a t(9;22) genomic translocation. This reciprocal translocation between the long arms of chromosomes 9 and 22 produces the *BCR-ABL1* fusion oncogene, leading to overactive and unregulated BCR-ABL1 tyrosine kinase activity that presents clinically as clonal proliferation of myeloid white blood cells in the peripheral blood and bone marrow. The use of tyrosine kinase inhibitors (TKIs) as treatment drastically improved the prognosis of CML patients; however, TKI resistance has proved a challenge for treatment through both BCR-ABL1-dependent and -independent mechanisms. Therefore, discovering alternative therapeutic options has been at the forefront of CML research. The Eiring lab has discovered that G0/G1 switch gene 2 (G0S2) plays a tumor suppressor role in CML and TKI resistance. G0S2 normally functions as an inhibitor of intracellular lipolysis, the breakdown of triglycerides stored in lipid droplets. Therefore, our goal was to further understand the mechanisms by which G0S2 acts as a tumor suppressor in CML progression and TKI resistance. Preliminary data suggested a role for G0S2 in regulating the mitochondrial electron transport chain. In the present study, we assessed the subcellular localization of G0S2 in CML cell lines, with the overarching hypothesis that G0S2 would colocalize with mitochondria in the cytosol. Altogether, our data unravel a novel role for G0S2 as a tumor suppressor in myeloid leukemia through direct effects on mitochondrial energy metabolism. Restoring G0S2 expression could be a novel strategy to improve TKI response rates in CML and possibly other types of cancers.

ABSTRACTS
October 13
9:00 a.m. – 12:00 p.m.

The Effect of Zip Code-Based Poverty Rates on Quality of Communication and Patient Healthcare Satisfaction among Patients of Outpatient Clinics in El Paso County, Texas

Bina Yarlagadda (MS3)
Mentor: Dr. Kristina D. Mena - UTHealth School of Public Health,
Dr. Christiane Herber-Valdez
Group 6 10/13/2022 9:00 a.m.

ABSTRACT
This study tested the hypothesis that zip-code based poverty levels are correlated to the quality and satisfaction of patient-centered education and communication for adults provided by medical personnel in primary care practices in El Paso. In many previous studies, low socioeconomic status is tied to inadequate health literacy as patients may not be well-informed about treatment and medications to take care of their health. In a region where lifestyle-related and preventable diseases are largely present, patient-centered education is of utmost importance. There is limited data on how zip code-based poverty levels directly correlates with the delivery of patient education and how well medical staff communicate with the patients. This project involved conducting a survey addressing questions that asked people to evaluate their healthcare experience in the past year. Specifically, it asked each participant to rate, using the Likert scale, how they felt they were counseled about their condition. For example, if they felt listened to by the doctor, the quality of communication between them and the medical staff would be rated as satisfied with the care they received. After collecting and analyzing the data, it was interesting to find a strong correlation between zip-code based poverty level and whether or not a participant would recommend their doctor, one measure of satisfaction. However, there were no significant correlations between zip-code based poverty level and the quality of communication with nurses, doctors, regarding medication, regarding patient-centered decision making, and rate of visit. Thus, it is important to conduct further research into areas with high poverty levels to identify “high-risk” areas and understand the specific communication behaviors of both patients and physicians to help provide effective care.

MECHANISMS OF MITOCHONDRIAL DYSFUNCTION IN DEVELOPMENT OF MISMATCH REPAIR-DEFICIENT ENDOMETRIAL CANCER

Diana Moreno (MS2)
Mentors: Dr. Melinda Yates and Mikayla Borthwick - The University of Texas MD Anderson Cancer Center
Group 6 10/13/2022 9:30 a.m.

Abstract

BACKGROUND: Lynch syndrome (LS) is a hereditary cancer susceptibility syndrome, carrying about 60% lifetime risk of endometrial cancer (EC) development. LS is caused by mutations in mismatch repair genes, leading to mismatch repair deficiency (MMRd) and DNA hypermutability. LS-associated EC is most commonly caused by loss of MSH2 expression. Unfortunately, no robust non-surgical interventions are available for EC prevention for women with LS. Identifying additional cellular mechanisms that impact cancer development caused by MSH2 loss could provide novel opportunities for prevention. Preliminary studies have shown that MSH2-deficiency is correlated with mitochondrial Complex II loss, increased mitochondrial-specific reactive oxygen species (ROS), and oxidative DNA damage. The purpose of this project is to define the specific impact of MSH2 loss on mitochondrial function and oxidative DNA damage in endometrial cancer using isogenic cell lines to identify potential targets for LS-associated EC prevention. We hypothesize that MSH2 loss disrupts mitochondrial function via complex II loss and increases oxidative stress-induced DNA damage in human EC cells.

METHODS: To determine the effects of MSH2 loss on oxidative stress and mitochondrial function, we performed lentiviral shRNA knockdown (KD) of MSH2 in two human EC cell lines (KLE, Hec1a) and MSH2 overexpression (MSH2++) in another (MFE280). Western blot was performed to confirm MSH2 knockdown or overexpression and detect expression levels of mitochondrial proteins. Mitochondrial stress tests were performed to measure mitochondrial function at baseline and under induced stress. Immunofluorescent (IF) staining was performed to compare oxidative DNA damage in the MSH2-KD, MSH2++, and control cell lines after pharmacologically-induced oxidative stress (100µM H_2O_2).

RESULTS: MSH2-KD reduced Complex II expression, yet had variable effects on mitochondrial function. MSH2 overexpression increased both complex II expression and mitochondrial function. Oxidative stress-induced DNA damage was significantly increased following MSH2-KD in one cell line, but not in the other, likely because the latter had elevated DNA damage in the parental cells.

CONCLUSIONS: Complex II plays an important role at the intersection between oxidative stress signaling and cellular respiration. While MSH2-KD directly decreased complex II expression in EC cells, the functional impact of complex II loss on MSH2-deficient EC development remains to be understood. By understanding direct effects of MSH2 loss on mitochondrial function, oxidative DNA damage, and susceptibility to induced oxidative stress, we may open new avenues for LS-associated EC prevention. Further, mitochondrial dysfunction could be studied as a key susceptibility mechanism for broad EC development.

THE EFFECTS OF HISTAMINE (H2) BLOCKERS AND PROTON PUMP INHIBITORS ON COVID-19 PATIENTS

Eshani Kishore (MS2)
Mentor: Dr. Fatma Dihowm
Group 6 10/13/2022 10:00 a.m.

Abstract

Proton pump inhibitors (PPIs) and histamine (H_2) blockers are frequently used in the treatment of stress-induced gastritis and ulcer formation in patients hospitalized with COVID-19. A retrospective chart study utilized on data collected from 1478 patients at University Medical Center of El Paso admitted between March 2020 and May 2021 for COVID-19 who were already taking histamine (H_2) blockers or proton pump inhibitors. Preliminary data collected showed an association between proton pump inhibitor usage and greater rates of mortality and hospitalization with a slightly higher number of days of illness before hospital discharge. Conversely, those who took a histamine (H_2) blocker had a 76 percent reduction in days of illness to patient discharge. Nevertheless, taking histamine (H_2) blockers was still associated with some inherent risk, as those taking histamine (H_2) blockers were more likely to require oxygen supplementation compared to those who were not. Similarly, patients who were taking a histamine (H_2) blocker had a greater median number of days of illness to patient discharge/death compared to those who were not on the histamine (H_2) blocker. Since proton pump inhibitors and H_2 blockers are the most prescribed drugs for the treatment of GERD, acute gastritis, peptic ulcer disease, and stomach ulcers—which are more common amongst an immunocompromised population—these initial findings have massive ramifications for hospitalized COVID-19 patients.

NF-κB activation in Human microglial cells upon Borrelia infection

Shahrukh Chaudhry (MS3)
Mentor: Dr. Jorge Cervantes-Gonzalez
Group 6 10/13/2022 10:30 a.m.

Abstract

In this study we attempted to quantify the level of NFkB in microglial cells stimulated with *Borrelia Burgdorferi***.** In doing so, we are one step closer to building an inflammatory profile of Lyme neuroborreliosis as the NFkB is one of the main pathways for increased inflammation. NF-kB-eGFP plasmid was transfected into HMC3 microglial cells allowing us to use a plate reader measuring fluorescence to measure the level of NFkB activation. The eGFP fluorescence measurement, which correlates to NFkB activation was measured in cells stimulated with borrelia and compared to unstimulated microglial cells. Our results showed a significant increase in NFkB activation in stimulated vs unstimulated cells which shows that the NFkB pathway of inflammation is vital for neuroborreliosis to have its effect through continued neuronal inflammation. The results of this study are applicable to real cases of neuroborreliosis because it shows that inhibiting the NFkB pathway may have a role in decreasing the symptoms and disease progression in neuroborreliosis.

BCG modulates human dendritic cells response to SARS-CoV-2 S-glycoprotein

Regina Ambe (MS2)
Mentor: Dr. Jorge Cervantes-Gonzalez
Group 7 10/13/2022 9:00 a.m.

Abstract

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a pathogenic and highly transmissible coronavirus that emerged in 2019 and has caused the COVID-19 pandemic. The Bacille Calmette-Guerin (BCG) vaccine is used against non-pulmonary forms of tuberculosis in developing countries. In the U.S, it is used as immunotherapy for bladder cancer.

We aimed to explore if pre-exposure of human dendritic cells (DCs) to BCG could modulate their response to SARS-CoV-2 S-glycoprotein. Dual THP-1 cells containing two reporter plasmids for transcription factors NF-κB and IRF were differentiated into DCs over 6 days using commercial Mo-DC differentiation media. Tumor necrosis factor-α (TNF-α) was used to mature cells following differentiation. DCs were pre-exposed to BCG and then stimulated with SARS- CoV-2 S-glycoprotein, and the NF-kB and IRF activation was measured by a colorimetric assay for the secretory embryonic alkaline phosphatase (SEAP) and Luciferase using Quanti-Blue and Quanti- Luc respectively.

We have shown that BCG does modulate the effect of SARS-CoV-2 S-glycoprotein on dendritic cells (DCs). Pre-exposure to BCG increased IRF and NF-kb activation in response to SARS-CoV-2 S-glycoprotein.

Our findings could translate into future therapeutic approaches in the treatment of viruses like SARS-CoV-2.

Initial Assessment and Comparison of Competency, Attitudes and Knowledge of Palliative Care amongst Physician at Different Stages of Training

Tetsuyuki Kawai (MS3)
Mentor: Dr. Weber
Group 7 10/13/2022 9:30 a.m.

ABSTRACT

Background: With the creation of a new palliative care program in late 2021 at a county hospital in El Paso, TX and the subsequent rapid expansion of palliative care services, we wanted to assess the initial competency, attitudes, and knowledge of physicians and those in training. The objective of this research was to gather attending physicians, residents, and medical student's perceived self-competence within Palliative Care.

Methods: Faculty, Resident Physicians, and medical students at TTUHC of El Paso were surveyed by email. The questionnaire measured their prior knowledge, their self-reported confidence in treating palliative care patients and their knowledge of Palliative Care.

Results: In total participated in this study. A large majority of participants saw the benefit of palliative care and considered palliative care education to be necessary for both them and their peers. However, we saw that our cohort had very little prior training and that medical students had the least training and knowledge about Palliative Care.

Conclusion: With the need for Palliative Care increasing, current and prospective physicians will encounter palliative care patients. Although our cohort was not trained in palliative care, most of our respondents thought palliative care would benefit their patient population and that their department would benefit from training. In this study, we saw how medical students and certain specialties such as surgery have less knowledge and comfort with Palliative Care than other services. Therefore, it is important to improve Palliative Care education early in the medical school curriculum and to continue this throughout residency and ongoing CME for experienced attendings.

Effects of race-ethnicity and country of origin on incidence and survival in breast cancer

Vutha Nhim (MS3)
Mentor: Dr. Anna M. Eiring

Group 7 10/13/2022 10:00 a.m.

Abstract

Background: Hispanics make up 82% of the U.S./Mexico border population, a region of socioeconomic inequity and barriers to healthcare access. Breast cancer (BC) is the leading cause of cancer-related deaths in Hispanic women. Identifying disparities affecting BC incidence and overall survival (OS) is a priority for optimizing care. We hypothesized that differences in race-ethnicity, border proximity, BC subtype, and birthplace were associated with BC outcomes.

Methods: BC data from the Texas Cancer Registry (1995-2016) were analyze by race-ethnicity, and birthplace according to BC subtype (luminal A, B, HER2 and triple-negative). Other covariates included age, location, treatments, and insurance status. Differences in OS were analyzed with Kaplan-Meier survival curves and multivariable Cox regression.

Results and Discussion: Hispanic BC patients were diagnosed at a younger age than non-Hispanic whites (NHW) (57.2 years versus 61.1 years). There was a significant difference in OS between Hispanic patients (U.S. and Mexico born) and NHW, and Hispanic patients born in the U.S. had worse OS when diagnosed with TNBC (HR 1.14, $p=0.044$). Non-Hispanic black (NHB) patients demonstrated significantly poorer OS when diagnosed with Luminal A, B and HER2 subtypes (HR 1.20-1.24, $p<0.05$ for each subtype). Mastectomy was protective for all subtypes (HR 0.61-0.65, $p<0.001$ for all subtypes), while chemotherapy, hormone therapy and radiation were beneficial for treating select subtypes. Patients diagnosed with Luminal A and HER2 covered by private insurance demonstrated better OS compared to patients without insurance or Medicare/Medicaid (0.83 and 0.66 respectively with $p<0.05$ for both subtypes).

Conclusions: Race-ethnicity, treatments received and ability to pay for care were significant predictors of OS. Hispanics born in the U.S. had significantly worse OS compared with Hispanics born in Mexico and NHW. This finding may be related to effects attributed to migration, acculturation, and healthcare access. Improving screening, access to treatment and close follow-up would improve the health of Hispanics in Texas born in both the U.S. and Mexico. NHB patients continue to demonstrate poor OS and future work should focus on addressing barriers to healthcare due to long-standing issues of systemic racism.

A mediation analysis of maternal smoking, gestational age, and birth weight in a predominantly Hispanic population on the US-Mexico border

Chinodebem Ogbutor (MS3)
Mentor: Dr. Zuber D. Mulla
Group 7 10/13/2022 10:30 a.m.

Abstract

Purpose: Published data on the indirect effect of maternal smoking on birth weight as mediated by gestational age in Hispanic populations are lacking. Our goal was to conduct such a mediation analysis using data from El Paso County, Texas.
Methods: El Paso County is located on the US-Mexico border. A simple mediation analysis was conducted using year 2010 El Paso County birth certificate data. The SAS macro PROCESS 3.5.3 was used to estimate the direct and indirect effects of active maternal smoking (by trimester) on birth weight (in grams) in the setting of linear regression. The single mediator was gestational age in weeks. A direct or indirect effect was deemed to be present if the 95% confidence limits (CL) excluded 0. Analyses were adjusted for multiple variables including maternal pre-pregnancy body mass index. The indirect effect was reported along with a 95% bootstrap CL.
Results: 16,654 singleton births were included in the cohort. The majority of the mothers were White Hispanic (87.2%). The mean (SD) birth weight was 3198.6 grams (517.2). A direct effect of maternal smoking during each trimester on birth weight was detected. An indirect effect of maternal smoking on birth weight was not detected in any of the trimesters. In adjusted analyses for the third trimester, the indirect effect for every one-unit increase in the mean number of cigarettes smoked per day was -4.18 (95% bootstrap CL: -10.64, 1.99).
Conclusion: In our large, predominantly Hispanic cohort, it appears that gestational age is not a mediator of the effect of maternal smoking on birth weight. Future studies in our population should explore other possible mediators of this association.

A Role for G0/G1 Switch Gene 2 (G0S2) in Normal and Malignant Myeloid Differentiation

Nhu Nguyen (MS3)
Mentor: Dr. Anna M. Eiring

Group 8 10/13/2022 9:00 a.m.

ABSTRACT

Tyrosine kinase inhibitors (TKIs) have been one of the first line treatment options for chronic myeloid leukemia (CML) patients. Despite improved rates of hematological response and remission with these therapeutic options, there are still cases of resistance or relapse after initial response (Zhou, 2018). Known causes of resistance include mainly BCR-ABL kinase domain mutations, amplification, and/or modifications of other oncogenic pathways. We have identified a key player in multiple scenarios of TKI resistance – G0/G1 switch gene 2 (G0S2). G0S2 is known for many different functions, including lipolysis, de novo lipogenesis, oxidative phosphorylation, apoptosis, and quiescence. Here, we explore its role in normal and malignant myeloid differentiation. Our data suggest that downregulation of G0S2 blocks differentiation of myeloid cells, promoting progression of disease and therapeutic resistance. Thus, restoration of G0S2 may be of clinical utility in future exploration of CML treatment.

HOW SELF-PERCIEVED QUALITY OF SLEEP IS AFFECTED BY BRAIN STEM VOLUME

Sabrina Gambini (MS2)
Mentor: Dr. Hugo Sandoval
Group 8 10/13/2022 9:30 a.m.

ABSTRACT

The general population aims to receive proper sleep, yet the question arises why some may or may not be able to achieve this goal. Although common sleep disorders establish a cause for this impairment that some people face each night, it is important to look deeper into the brain structures that coordinate sleep to find a root cause. For example, the reticular activating system is located within the brain stem to regulate sleep-wake patterns; therefore, it could be pertinent to determine if variations in this structure impact sleep quality. This research project sought out to determine whether there was a correlation between brain stem volume, which houses the reticular activating system, and sleep quality. To do so, I used the Human Connectome Project database, which provides data on the neuroanatomical brain structures of individual subjects along with information about their medical and social history. Of the data provided, I focused on the scores from the Pittsburgh Sleep Quality Index (PSQI) questionnaire as my measure of sleep among the sample population. Initial statistical evaluation considered any correlation between Brain Stem Total Volume and the subjects' self-reported sleep quality score. Then, the data was further analyzed to determine any significant differences in the average brain stem volumes between those with "Normal Sleep" and those with "Abnormal Sleep", as defined by the questionnaire's metrics. The results indicated that there was not a statistical significance when correlating brain stem volumes to PSQI scores. There was also no statistical significance between brain stem volumes of those with lower PSQI scores to those with higher PSQI scores. When analyzing the data in subcategories, however, I found that there was near significant correlation within the "Other" (non-white) race sample that correlated a smaller brain stem volume to worser sleep quality. Despite non-significant results from this project, some interesting findings were made that can point one to further evaluate the role of the brain stem in sleep within specific racial populations.

Importance of Subjective SES and Neighborhood Disadvantage for Adolescents with Type 1 Diabetes

Taylor Mackie (MS2)
Mentor: Dr. Sarah Jaser - Vanderbilt University Medical Center
Group 8 10/13/2022 10:00 a.m.

Abstract

Objective As the prevalence of type 1 diabetes continues to rise, adolescents from low-income and underrepresented groups are at greater risk for problems with diabetes management and poorer long-term health outcomes. Rather than focus on a single socioeconomic variable, such as income or insurance status alone, we examined associations between multiple indicators of socioeconomic status with diabetes outcomes.

Methods In total, 198 teens (M_{age} = 15.4 ± 1.4, 58% female, 60% White, non-Hispanic) completed measures of diabetes management, diabetes distress, and subjective socioeconomic status. Glycemic indicators were extracted from medical records, and participants' addresses were used to determine Area Deprivation Index.

Results Higher levels of neighborhood disadvantage were significantly associated with higher hemoglobin A1c levels, but not time in range nor blood glucose. Subjective socioeconomic status was a stronger predictor than Area Deprivation Index for all glycemic variables, diabetes management, and diabetes distress.

Conclusions Results suggest that higher levels of neighborhood disadvantage may make it more difficult for adolescents to meet glycemic targets. Given strong associations between subjective socioeconomic status with glycemic control, diabetes management, and diabetes distress including subjective status on screening tools may identify adolescents who would benefit from additional support.

How can anime be used as a fun way to teach host-pathogen interactions in microbiology

Quang To
Mentor: Dr. Jorge Cervantes-Gonzalez
Group 8 10/13/2022 10:30 a.m.

Abstract

The transition to online content within education has opened the educational field to many new and unique opportunities previously unavailable or infrequent. The use of *anim*e within education is beginning to crop up. How can anime be used as a fun way to teach microbiology? *Anime* is a fun and entertaining media to portray information by using a character story to explain the concepts needed. This is a piloting study to use a story-based animation to tell a tale and educate students. Using Photoshop, Opentunez, and Articulate 360 Storyline, we created an anime depicting the life of *S. Aureus* to teach incoming medical students the basics of microbiology to better prepare them for beginning medical school. Symbolism and cultural references used within the *anime* help to create strong associations with to the material. On a Likert scale of 1-5, with 1 being strongly disagree and 5 being strongly agree, students found the anime to be entertaining, (mean 4.5) and helped them to feel better prepared for medical school (mean 4.12). This shows that anime has a place within medical school curriculum to teach students material in a method that is fun, engaging, and ties in cultural values and experiences. It is worth diverting more resources and effort into expanding educational media.

KNOCKOUT OF PD-L1 PROMOTES IMMUNE SYSTEM EVASION IN HUMAN GLIOBLASTOMA CELLS

Soroush Farsi (MS3)
Mentor: Dr. Huanyu Dou
Group 9 10/13/2022 9:00 a.m.

Abstract

Programmed death ligand 1 (PD-L1) is an important cell signaling protein that helps immune cells, especially T- cells, differentiate between normal and cancerous cells in the human body. Some cancers such as glioblastoma multiforme (GBM) are hard to defeat due to their expression of PD-L1 which not only masks them from the immune system, but also promotes GBM growth and migration. The introduction of the CRISPR/Cas9 genomic editing technique has enabled us to detect and delete both intra- and extracellular expression of PD-L1 in human GBM cells. Inhibition of PD-L1 expression in cancer cells inhibits tumor growth and migration, but further work is needed to optimize PD-L1 knockout in human GBM. In order to target PD-L1, two single guide RNA sequences (sgRNA) were located on the *PD-L1* gene with the first targeting the forward strand near base pair 82, and the second one targeting the forward strand near base pair 165. These sgRNA's were cloned into the CRISPR/Cas9 multiplex system individually and together for transfection into human U87 GBM cells. In addition to these dual-sgRNA's, a homology-directed repair template was also designed and used to increase PD-L1 knockout this study, we optimized the concentrations and ratio of the Cas-9 nuclease and the HDR template to yield the highest knockout of PD-L1 compared to the control. Western blot analysis and immunofluorescence assays suggest **dual-sgRNA CRISPR/Cas9 + HDR with 38 ug/mL of Cas9-g82/165 (MP) 0.5 ug/mL HDR** is the best concentration to use to increase PD-L1 knockout, while reducing off-target effects. The results of this study increase the specificity and efficiency of the experiment by identifying the correct amount of Cas9/HDR template to use to achieve the highest knockout of PD-L1 in human GBM cells.

Evaluating the level of evidence for different non-opioid modalities in pain management for post-knee and hip surgery

Amy Nguyen (MS3)
Mentor: Dr. Evan Corning
Group 9 10/13/2022 9:30 a.m.

Abstract:

Background

Pain management during the post-operative period of knee and hip surgery is very important in determining the outcome. However, the use of opioids should be minimized to avoid side effects and addictive tendency. The objective of the study is to perform literature reviews to evaluate the effectiveness of peripheral nerve block, gabapentinoids, corticosteroids and acetaminophen as non-opioid modalities in reducing pain scores and total opioid consumption after knee and hip surgery.

Methods

PUBMED is used as a search engine to select articles for review. After literature review, each non-opioid modality will be discussed and ranked for grade of recommendation and level of evidence.

Results

From 1697 articles identified, 375 meta-analysis studies, 4 randomized control trials and 13 retrospective studies were chosen to be reviewed.

All selected literature for peripheral nerve blocks showed that this approach significantly lowered resting pain or pain levels (from $p < 0.01$ to $p = 0.021$) and opioid consumption (from $p < 0.001$ to $p = 0.0021$). All three meta analyses and one randomized controlled trial showed the beneficial effects of gabapentinoids in controlling pain and reducing opioid consumption (from $p < 0.001$ to $p = 0.005$). Similarly, literature evidence for corticosteroids revealed that this modality causes a reduction in pain (from $p = 0.0002$ to $p = 0.03$) and reduction in opioid consumption (from $p < 0.0001$ to $p = 0.04$). However, meta-analyses and randomized controlled trials on acetaminophen showed inconsistent results in pain reduction (from $p < 0.001$ to $p = 0.71$) and reduction in opioid use (from $p < 0.001$ to 0.69).

Conclusion

Peripheral nerve block, gabapentinoids and corticosteroids are highly recommended as non-opioid adjuncts for pain management after knee and hip arthroplasty at high level of evidence. Acetaminophen also can be considered for reducing pain scores and opioid consumption with weak recommendation at high level of evidence.

HPV Self Sampling and the Health Belief Model

Sania Ali (MS3)
Mentor: Dr. Jessica Calderón-Mora
Group 9 10/13/2022 10:00 a.m.

Abstract

Background: The aim of this study is to see if HPV self-sampling is preferred over pap smears based on the Health Belief Model (HBM) and what psychosocial factors are related to the completion and acceptability of HPV self-sampling among Hispanic women along the US-Mexico border region.
Methods: This is a secondary analysis of a randomized control trial that was done from 2014-2015. Participants were recruited from the local El Paso community. The inclusion criteria were women ages 30 to 65 who did not have history of cervical cancer screening in the past three years. Women who were up to date with cervical cancer screening, had history of cervical cancer, or had a hysterectomy were excluded. HPV and cancer knowledge, as well as HBM variables were tested after high-intensity, promotora, and low-intensity, handout based, educational interventions.
Results: Two hundred and one women, mostly Hispanic women, participated in the study. The study found a statistically significant change in knowledge regarding both HPV & cervical cancer post-intervention implementation ($p = <0.001$ for both). There was also an increased in self-efficacy after educational interventions ($p = 0.025$). However, there was no significant change in perceived susceptibility and severity of HPV and cervical cancer in the participants.
Conclusions: Post-intervention, women had increased knowledge of HPV and cervical cancer, regardless of which intervention they had.

Preparing Health Professions Students for Culturally Sensitive Practice

Nivethitha Manohar (MS3)
Mentor: Dr. Priya Harindranathan
Group 9 10/13/2022 10:30 a.m.

Abstract

Background: Failure by a healthcare provider to recognize sociocultural differences can affect communication and decision-making, leading to healthcare disparities. Healthcare educators in the El Paso region are challenged to prepare students for culturally sensitive practice, considering the sociocultural factors and barriers to care.

Purpose: To identify 1) What local cultural factors must be addressed in health professions education at Texas Tech University Health Science Center (TTUHSC) and University of Texas at El Paso (UTEP) to prepare students for culturally sensitive practice? and 2) What strategies and methods do educators at these institutions use to prepare students for culturally sensitive practice?

Methods: A phenomenological study design was used to understand the experience of educators and leaders in preparing health professions students to engage in culturally sensitive practice. Eighteen participants in education and leadership roles within TTUHSC and UTEP (5 teaching faculty, 9 education leaders, and 4 community practitioners) participated in semi-structured interviews and a focus group. Interviews were audio recorded, transcribed, and analyzed using thematic analysis.

Results: Local contextual factors include those that speak to the dynamics of the border region and cultural diversity. Existing efforts to prepare students include strategies implemented with varying degrees of sustainability.

Conclusion: In order to graduate health professionals who can ensure the dignity of a patient's identity and culture, we must develop and implement curricula that meaningfully integrates cultural competency.

Characteristics of Acute Lymphoblastic Leukemia in Hispanic Population in El Paso and Risk of Treatment-Related Complications

Cyrena Petersen (MS3)
Mentor: Dr. Ranjan Bista
Group 10 10/13/2022 9:00 a.m.

Abstract

Recent literature has shown that there is an increased risk of morbidity and mortality for the Hispanic population compared to the non-Hispanic population for Acute Lymphoblastic Leukemia (ALL). As El Paso, Texas is a border city, who's population is primarily Hispanic, our hypothesis was that the Hispanic population in El Paso is at increased risk for higher morbidity from ALL. This study was a retrospective cohort study that analyzed the relative risk of higher risk stratification of disease for ALL, occurrence of relapse, and occurrence of treatment complications between Hispanic and non-Hispanic patients in El Paso. There were no statistically significant differences between the Hispanic and non-Hispanic patients in our study. This goes against current literature and opens up further discussion on what differences might be noted in the El Paso population that may be different from populations that were previously studied.

Effects of an Exclusive Human Milk Diet on Enteral Feeding Outcomes of Neonates with Congenital Gastrointestinal Disorders

Heabah Assi (MS3)
Mentor: Dr. Sadhana Chheda
Group 10 10/13/2022 9:30 a.m.

Abstract

Infants born with congenital gastrointestinal disorders (CGD), such as gastroschisis, intestinal atresia, omphalocele, malrotation, midgut volvulus, experience significant morbidity and mortality. Multiple surgeries are usually required before functional bowel continuity is achieved. These conditions predispose to loss of bowel length and function, intestinal infections such as necrotizing enterocolitis, leading to intestinal failure and growth failure. Current management focuses on providing adequate caloric intake to promote growth and is currently done using a combination of parenteral nutrition and enteral feedings. However, long-term use of parenteral nutrition has multiple complications and can result in cholestasis and cirrhosis, eventually leading to end-stage liver failure that requires transplant.

Human milk (HM) is considered to have numerous advantages and is considered an ideal source of nutrition for infants. Human milk contains numerous nutrients, ranging from immune protection factors to microbes and metabolites1 and has been associated with improved infant and maternal healthcare outcomes. HM has also been found to stimulate the development of healthy intestinal flora, modulate inflammatory processes, and encourage bowel maturity, repair, and function.

This study is designed to compare an exclusive human milk diet, comprised of Mother's Own Milk, pasteurized donor human milk, and donor milk-based fortifier, to formula or human milk supplemented with bovine fortifiers in infants with congenital gastrointestinal disease. This study hypothesizes that an exclusive human milk diet will decrease the amount of time neonates are on parenteral nutrition, thus decreasing the incidence of complications such as necrotizing enterocolitis, sepsis, and episodes of feeding intolerance and decrease the time needed to achieve full enteral feedings while in the Newborn Intensive Care Unit (NICU).

Phytochemicals as Treatment Options for Hepatocellular Carcinoma

Jocelyn Olivares (MS2)
Mentor: Dr. Ramadevi Subramani

Group 10 10/13/2022 10:00 a.m.

ABSTRACT

Liver cancer is a prevalent cancer with a high mortality rate. There are very few curable treatments available at the moment with severe adverse effects, which makes it paramount to work on other treatment options. Many medicinal plants have been found to have already shown promise in providing therapeutic benefits. This study focuses on the anticancer effects of gedunin for the treatment of Hepatocellular Carcinoma (HCC).

Anti-proliferation effects of gedunin on liver cancer cells were assessed using MTS Assay. The impact of gedunin on stem cell population (ALDH+) in liver cancer cells was assessed using flow cytometry. Stem cell markers were assessed in gedunin treated liver cancer cells using western blot analysis.

Gedunin was shown to be effective in decreasing liver cancer cell proliferation. The data further indicates the decrease in stem cells population when treated with gedunin. Lastly, key molecular markers onvolved in stem cell generation were significantly reduced in liver cancer cells treated with gedunin when compared to control cells.

Overall, these results suggest gedunin shows promise as an anticancer agent against liver cancers and further studies is warranted to assess the role of gedunin on liver cancer stemness and metastasis.

Analysis of Hospitalizations for Ischemic Colitis in the U.S.

Shielah Mauntana (MS3)
Mentor: Dr. Mahesh Gajendran, Long School of Medicine
Group 11 10/13/2022 9:00 a.m.

Abstract

Background. Ischemic Colitis (IC) is a disorder characterized by a decrease in blood flow of the large intestine. With Ischemic Colitis's high mortality rate and its association with many cardiovascular diseases, it's important to understand the comorbidities and factors that might lead to these events. This study aims to find and assess factors that may be associated with ischemic colitis.

Methods. We conducted a cross-sectional study of adults with IC listed as the primary ED diagnosis from 2005 to 2014 using the Nationwide Readmission Database (NRD). The characteristics of the IC-related ED visits were analyzed.

Results. The estimated number of ED visits with a primary diagnosis of ischemic colitis from 2005-2014 was 541,267 people. Our results showed that the mean age of the cohort was 62 +/- 14 years, suggesting that most patients affected with IC are elderly. 387,485 patients were female, making up 71.6 % of the IC population. 153,662 patients were male, amounting to 28.4% of the IC population. 367,168 out of 541,267 IC patients were found to have hypertension (67.8%). 221,647 out of 541,267 IC patients were found to have fluid and electrolyte disorders (40.9%). 122,867 out of 541,267 IC patients were found to have chronic pulmonary disease (22.7%). 101,758 out of 541,267 IC patients were found to have uncomplicated diabetes (18.8%). 94,180 out of 541,267 IC patients were found to have deficiency anemia (17.4%). 88,497 out of 541,267 IC patients were found to have hypothyroidism (16.35%).

Conclusions. The IC-related ED visits have remained relatively stable from 2005 to 2014. The results suggest that female patients are more affected by ischemic colitis than male patients. The majority of IC patients are elderly. The most common comorbidities that IC patients had were hypertension, fluid and electrolyte disorders, Chronic Pulmonary Disease, uncomplicated diabetes, deficiency anemias, and hypothyroidism.

HIGH PREVALENCE OF COMPENSATORY HYPERINSULINEMIA IN U.S. TEENAGERS: THE 2015-2018 NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (NHANES)

India Bradley (MS3)
Mentor: Dr. David Cistola
Group 11 10/13/2022 9:30 a.m.

Abstract

Introduction: Early compensatory hyperinsulinemia (ECH) is the heightened response of the pancreas and liver to insulin resistance. The compensation is sufficient to maintain blood glucose and lipids within normal limits. Thus, individuals with ECH do not meet the criteria for prediabetes or metabolic syndrome and elude screening for diabetes risk. Separately, we reported that ECH in young adults is a hidden risk factor for midlife diabetes. *Research Question:* Is ECH a prevalent condition? *Hypothesis:* ECH is prevalent in the U.S., especially in younger people. *Specific Aim:* Estimate the 2015-2018 U.S. prevalence of ECH, overall and by age category. *Methods:* The fasting subsamples from the 2015-16 and 2017-18 NHANES cycles, ages 12 and up, were merged and analyzed as one dataset. We assigned each participant to one of four groups: reference group, ECH, hyperglycemia and/or dyslipidemia without diabetes, and diabetes. The period prevalence was estimated using the survey commands in STATA, incorporating sample weights, strata and clusters to generate results representative of U.S. populations. Prevalence is reported as the estimated percentage with 95% confidence interval (CI). *Results:* Using the top tertile of insulin as the cut point, the prevalence of ECH in the U.S. population was 9.4% (95% CI: 7.1, 9.2). It was highest in the 12-19 age group: 20.8% (95% CI: 17.5, 24,4) and second highest in the 20-29 age group: 16.8% (95% CI: 13.8, 20.1), decreasing further with age. *Conclusion:* Approximately one in five U.S. teenagers has ECH, a hidden condition that increases diabetes risk. Teenagers and young adults with ECH represent untapped target populations for the prevention of diabetes and prediabetes.

Igniting children's enthusiasm for microbes with an origami paper microscope

Joshua Gardner (MS3)
Mentor: Dr. Cynthia Perry and Dr. Jorge Cervantes
Group 11 10/13/2022 10:00 a.m.

Abstract

The current COVID-19 pandemic has highlighted the urgent need for microbiology literacy in society. Microbiology knowledge, and its dissemination, can help inform and increase the objectivity of important decisions, such as treatment or vaccination.
A microbiology learning experience, titled "What you can't see can hurt you" was delivered as part of a larger outreach event (Medventure) where children were exposed to various aspects of medicine and health care fields. The activity involved an introduction to and a discussion of bacteria of clinical importance, and the use of a smartphone-attachable paper-based foldable microscope.
To explore the impact of this activity on participants' interest in science and microbiology, a pre- and post-activity survey of 5 questions in an emoji-based Likert scale was completed by the participants.
A statistically significant increase in their interest in microbes and where to find them was observed after the event.
Making microbes visible to children and allowing them to capture images of microbes exposes them directly and personally to microscopy and microbiology. An affordable low-cost paper-based microscope can become an alternative approach to teaching and learning to deliver clinical microbiology information to a wide audience range.

The Effects of Acute Kidney Injury and COVID-19 in a Hispanic Population

Kristen Helmsdoerfer (MS3)
Mentor: Dr. Fatma Dihowm
Group 11 10/13/2022 10:30 a.m.

Abstract

The effect of SARS-CoV-2, the novel coronavirus that causes COVID-19 has been especially severe on the minority communities across the country (1). The Hispanic population has been especially hit hard with the COVID-19. Although there are few studies (1,2) relating to this sub-population, we have little data on the prognosis of patients with markers of acute kidney injury. In the state of Texas, more than 40% of the confirmed cases are attributable to Hispanic population (3).

To study the effects of renal impairment among Latino patients, data from patients of COVID-19 from March 1st, 2020 to May 31st, 2021 will be selected first based on ethnicity selecting for Latino. Patients who matched our inclusion criteria (age of 18-85 years, Hispanic, hospitalized >48 hours and treated for COVID19) were 1478. Primary outcomes including mechanical ventilation, admission to the ICU, duration of hospitalization and need for oxygen upon discharge were statistically analyzed. This study is a comparative, retrospective study.

The data was also categorized by renal impairment type (Normal, Acute Kidney Injury, Chronic Kidney Disease, and End-Stage Renal Disease). Association across renal impairment and renal impairment type was assessed using an un-paired t-test, Mann-Whitney test, analysis of variance (ANOVA), Kruskal-Wallis, Chi-square, and Fisher's exact test. A univariate relative risk and linear regression analysis (depending on outcome variable) was conducted to determine the effect of renal impairment (binary) with COVID positive patients admitted to the hospital. Relative risk (RR), linear coefficient, 95% confidence intervals (CI), and p-values were used to summarize the analysis. Statistical significance was considered at p-values less than 5%. All statistical analysis and data management was conducted using Stata V17.

The median age for patients with renal impairment was 64.26 versus 55.72 without renal impairment with men being affected more than women. Of note, patients with renal impairment were treated more with a statin, had higher troponin levels and evidence of myocardial infarction. Patients with renal impairment had almost a four-fold incidence of thrombocytopenia compared to those with normal renal function. Patients with renal function had greater incidence of hypertension and more frequent treatment with therapeutic anticoagulants or warfarin and aspirin. However, patients with renal impairment did not show statistical significance for increased treatment with convalescent plasma, monoclonal antibodies, azithromycin, prednisone, and hydroxychloroquine. In fact, patients with renal impairment were treated less frequently with dexamethasone and remdesivir than their counterparts.

We found significant evidence showing that patients with any form of renal impairment with co-infection of COVID-19 had an increased length of stay, rate of transfer to the ICU, and mortality rate than those without impairment. Additionally, these patients were at higher risk of developing increased troponin levels and subsequent myocardial infarction. Patients with evidence of renal impairment had a significant increase in thrombocytopenia. Overall, AKI showed worse outcomes compared to other forms of renal impairment and further studies need to be conducted to investigate reasons for this.

Utility of Aspirin and Acetaminophen Serum Levels as Routine Screening in Psychiatric Admissions

Mark Raynor (MS2)
Mentor: Dr. Stormy Monks
Group 11 10/13/2022 11:00 a.m.

Abstract

Overdose on acetaminophen (APAP) and aspirin (ASA) are serious concerns that emergency physicians face many times in the emergency department. However, screening most patients that come through the door is not an effective strategy. The purpose of this study was to provide further evidence that screening psychiatric patients for acetaminophen and aspirin overdose without indication of ingestion provides no utility to patient care. This study was a retrospective chart review conducted at the University Medical Center (UMC) of El Paso Emergency Department and El Paso Children's Hospital. Nine hundred and ninety-two charts were manually reviewed by research personnel to screen for potential study participants. Study participants were identified by meeting the inclusion criteria outlined in the methods section. If the patient chart showed signs of intentional ingestion, they were not included in the study. This eliminated 294 patient charts. If they were presenting with a psychiatric chief complaint, then they were analyzed further to be included in the study. The study results show that screening for acetaminophen and aspirin based solely on psychiatric chief complaint is excessive. Further analysis and results indicated that testing based on altered mental status and suicidal ideation without suspected ingestion also provided no utility to patient care. One of the secondary aims of this study was to provide more generalizable patient demographic data to help provide further evidence that this test should be eliminated in certain circumstances. The US health care system has many unnecessary tests that have no proven benefits, yet they are continually done in practice. This study aims to help discard unnecessary wasteful testing that may lead to an increase in patient transfer times.